



Contribution ID: 96

Type: **Invited**

Radiative Processes with Twisted Electrons, Photons and Neutrons

Monday, September 16, 2019 9:10 AM (30 minutes)

The report will provide an overview of a number of radiation processes involving twisted particles, that is, particles with a non-zero projection of the orbital angular momentum on the direction of motion of a particle.

In this talk I review the basic properties of twisted particles and unusual properties of many atomic processes with twisted particles (new selection rules, unusual angular distribution and polarization of the final particles) which were recently considered by our Russian-German group, namely:

the Vavilov-Cherenkov radiation by twisted electrons;
radiation recombination of twisted electrons on protons;
ionization of atoms by twisted photons;
radiation recombination of twisted neutrons.

Collisions of twisted photons, electrons and neutrons may be of interest for investigations in physics of atoms, atomic and nuclear structures because they give us an additional degree of freedom: the orbital angular momentum.

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Session Classification: General Properties of Radiation from Relativistic Particles

Track Classification: General radiation properties from relativistic particles